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Indian Standard

SPECIFICATION FOR STEAM-JACKETED GHEE PANS (STAINLESS STEEL)

(*First Revision*)

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SPECIFICATION FOR STEAM-JACKETED GHEE PANS (STAINLESS STEEL)

(First Revision)

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Indian Standard

SPECIFICATION FOR STEAM-JACKETED GHEE PANS (STAINLESS STEEL)

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 23 October 1979, after the draft finalized by the Dairy Equipment Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Ghee pans are used to make ghee from milk cream or butter by boiling with the help of steam. The construction of ghee pans should be such that the ghee made in it shall have the characteristic aroma, it shall not char and the pan shall meet the hygienic requirements of food processing equipment.

0.3 This standard is intended to give the general requirements of stationary and tilting pans, with three different shapes of bottom generally in use, namely, hemispherical, conical and dished.

0.4 This standard was first published in 1964. In this revision, various provisions have been reviewed and up-dated in the light of latest technological developments in the country. Besides, figures of typical steam-jacketed ghee pans have been included for information and guidance.

0.5 The steam-jacket has been specified to withstand a nominal steam pressure of 300 KPa as this has been found to be sufficient for making ghee from cream and butter.

0.6 The Indian Standards Institution has also published IS : 4767-1968* which gives specifications for pans made of aluminium.

0.7 This standard contains clauses **4.5**, **5.2.4**, **6.1**(h), and **6.1**(j) which call for agreement between the purchaser and the supplier.

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*Specification for steam-jacketed ghee pans (aluminium).

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements for stainless steel steam-jacketed ghee pans.

2. CAPACITY

2.1 The pan shall be constructed with a nominal capacity of 250, 500 or 1 000 litres. For the purpose of this standard, the nominal capacity is the finished volume of ghee that can be manufactured per batch. The brimful capacity should be 20 percent more than the nominal capacity.

2.2 A tolerance of ± 5 percent shall be allowed on the nominal capacity.

3. MATERIALS

3.1 All component metallic parts which come into contact with the milk products shall be constructed from stainless steel conforming to grade 04Cr17 Ni12 Mo2 of IS : 6911-1972†. The weld areas and the deposited weld material shall be as corrosion resistant as the parent material. The steam-jacket shall be made of the same material as the pan or of steel plates (*see* IS : 2041-1962‡).

3.2 Non-metallic material may be used for sealing, but such material shall be non-toxic, relatively non-absorbent, and shall not impart any flavour or dissolve in the milk products, cleaning solutions or bactericidal agents normally used.

3.3 All such parts or the surfaces which do not come into contact with the milk products shall be made of such material which is either corrosion resistant, or made so by a suitable preventive treatment on a prepared surface.

4. GENERAL REQUIREMENTS

4.1 The pans shall be constructed with hemispherical, dished or conical bottoms. The pans may be of the stationary type or of the tilting type — tilting by manual operation.

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*Rules for rounding off numerical values (*revised*).

†Specification for stainless steel plate, sheet and strip.

‡Specification for steel plates for pressure vessels.

4.2 The pans shall have an open top with loose levers in two halves.

4.3 The jacket shall cover the bottom and at least two-thirds of the height of the pan.

4.4 The jacket of stationary pans may be in two separate sections.

4.5 The pan may be provided with an anti-splash brim, if required by the purchaser. A typical design is given in Fig. 1.

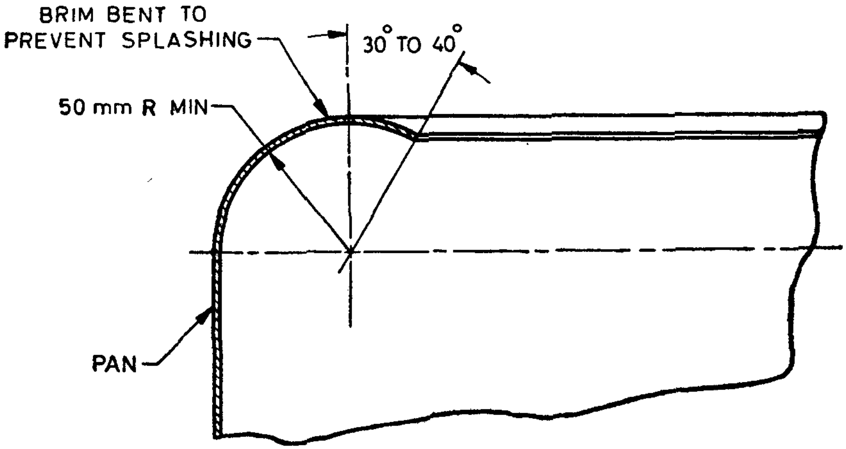

FIG. 1 A TYPICAL DESIGN OF ANTI-SPLASH BRIM FOR STEAM-JACKETED GHEE PAN

4.6 The thickness of the material for the pan and the jacket shall be such as to withstand a steam pressure of 300 kPa and shall conform to IS : 2825-1969* wherever applicable.

5. FABRICATION

5.1 The steam-jacketed ghee pan shall be fabricated in such a manner as to conform to the requirements laid down in **2** to **6** of the standard. The line drawings of typical steam-jacketed ghee pans (stationary and tilting types) are given in Fig. 2, 3 and 4.

5.2 Pan

5.2.1 All joints which come into contact with the milk products shall be butt-welded and finished smooth by buffing.

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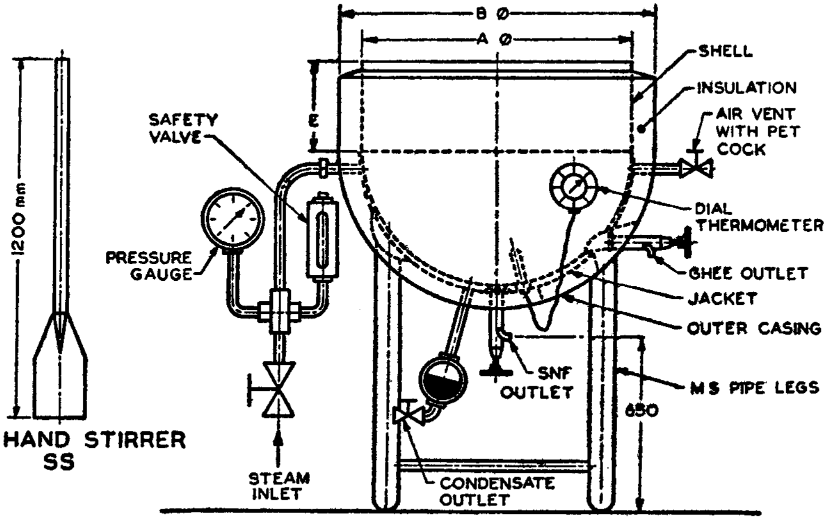
*Code for unfired pressure vessels.



All dimensions in millimetres.

CAPACITY IN LITRES	$A\phi$	$B\phi$	E
250	900	1 050	300
500	1 100	1 300	300
1 000	1 350	1 550	400

FIG. 2 A TYPICAL STEAM-JACKETED (PAN STATIONARY TYPE)

5.2.2 All surfaces which come into contact with the milk products shall be free from crevices and have a smooth finish. The internal corners joining the bottom to the cylindrical body shall not be less than 25 mm, and the saddle attached to brim for mountings shall have a radius of not less than 6 mm.

5.2.3 All component parts and appurtenances having surfaces in contact with the milk products shall be easily removable for cleaning or shall be readily cleansable in their places.

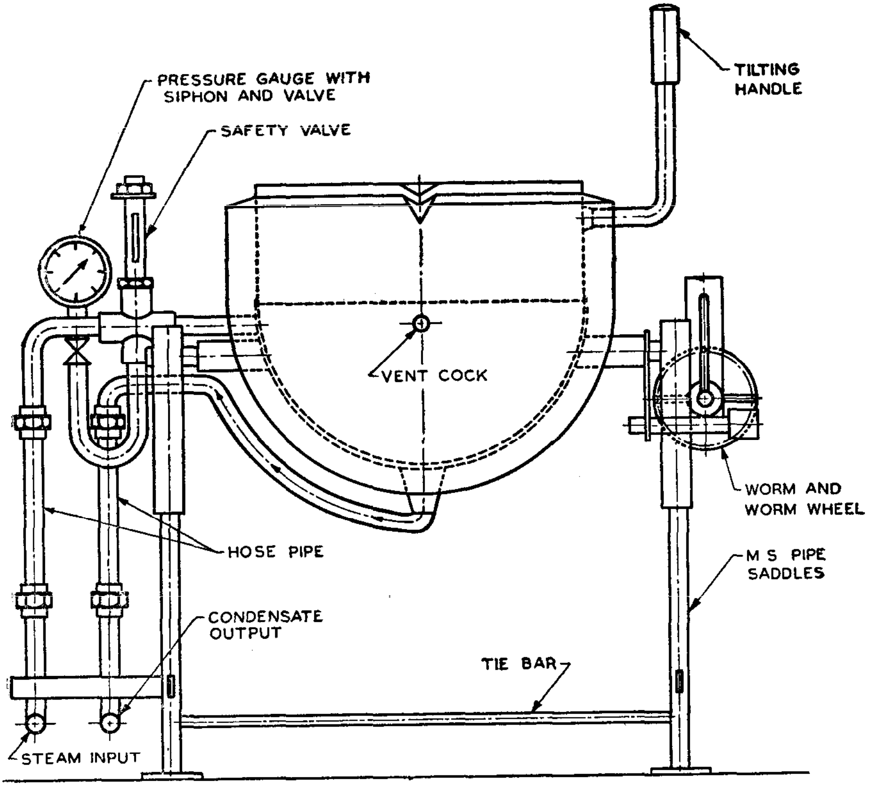


FIG. 3 A TYPICAL STEAM-JACKETED PAN (TILTING TYPE)

5.2.4 The stationary pans shall have central outlets at the bottom to facilitate removal of the contents. The inside diameter of these outlets shall not be less than 38 mm for the 250- and 500-litre pans and 50 mm for the 1 000-litre pans. An additional side outlet for the stationary pans or a bottom outlet for pans of the tilting type, may be provided, if required by the purchaser.

5.2.5 The brim of the pan shall be reinforced for strength by turning the top edges outside over a carbon steel reinforcing band or by turning the top edge outside or folding on the outside.

NOTE — This provision shall not apply, if the pan is made to meet the requirements under **4.5**.

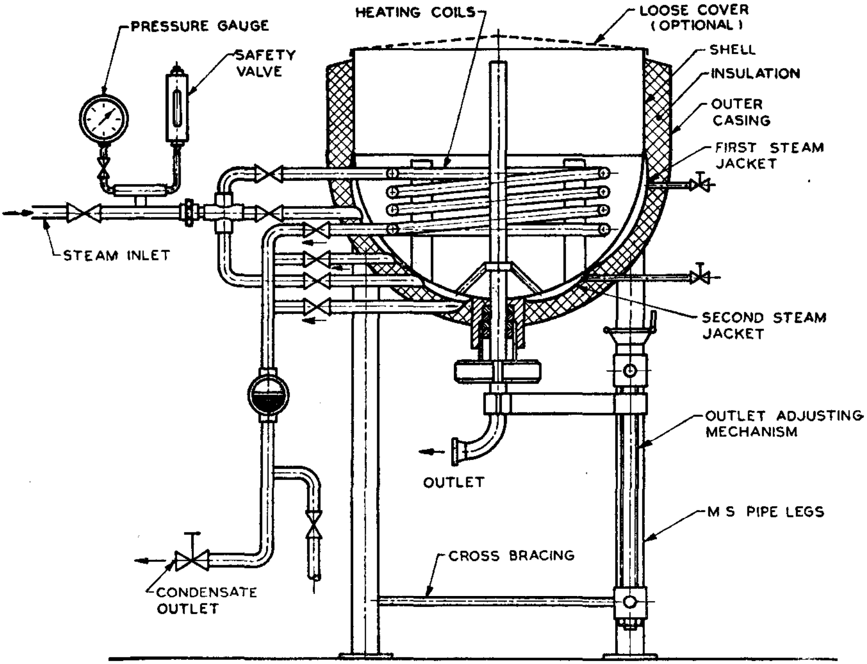


FIG. 4 A TYPICAL STEAM-JACKETED PAN (WITH HEATING COILS)

5.3 Jacket

5.3.1 The jacket shall be welded on the outside of the pan.

5.3.2 The jacket space shall be sufficiently large for the distribution of steam over the heating surface.

5.3.3 Branches and bosses for the jacket shall be welded.

5.3.4 The jacket shall have the following branches:

a) Air vent located at the bottom for the tilting type pan and at the top of the jacket opposite the steam inlet connection for stationary type. The air vent shall be of the minimum inside diameter of 10 mm for pans of 250- and 500-litre capacities and 20 mm for pans of 1 000-litre capacity. Two separate air vents shall be provided if the pan is constructed with two sections;

b) Steam inlet of a minimum of 25 mm inside diameter for pans of 250- and 500-litre capacities and 35 mm for pan of 1 000-litre capacity. Two separate steam inlets shall be provided for pans constructed with two sections;

c) Condensate outlet of a minimum of 12 mm internal diameter for pans of 250- and 500-litre capacities and 20 mm for pans of 1 000-litre capacity. The pan constructed with two separate sections shall be provided with a separate condensate outlet in each, the sizes shall be the same as for the pans for the single jacket;

d) Suitable baffle or divertor on the steam inlet to prevent direct impingement of steam on the pan; and

e) An extra stainless steel coil inside the pan suitable for steam at a pressure of 300 kPa may also be provided.

5.4 Insulation — The insulation shall be provided in two layers so as to eliminate hollow space between outer casing and jacketed inner shell. The joints of the second layer shall be staggered with those of the first layer. The insulation shall cover the bottom and the cylindrical body.

5.5 Outer Casing — The outer casing shall be welded and completely sealed so as to avoid penetration of moisture or vermin into the insulation.

5.6 Supports

5.6.1 The stationary type pan shall be supported on four tubular legs welded rigidly by suitable attachments or pads. The feet shall have flanges with holes for bolting to the floor. The legs shall have cross bracers.

5.6.2 There shall be two trunnions on bearings for the tilting type pan, which shall be sturdily supported on stands arranged with feet suitable for bolting to the floor.

5.6.3 Worm gearing shall be fitted to the tilting pan to facilitate discharge and the pan shall not tilt without effort.

6. ACCESSORIES

6.1 The pan shall be provided with the following accessories:

a) Pressure gauge of range 0 to 800 kPa (*see* IS : 3624-1966*) with siphon and isolating cock. The dial shall have a red mark at 300 kPa division;

b) Control valve(s) to isolate steam supply to the section or sections;

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*Specification for bourdon tube pressure and vacuum gauges.

c) Steam trap and strainer to automatically remove the condensate from the section(s);

d) Non-return valve to effectively eject air from the section(s);

e) Outlet cock, valve or sliding tube for the outlet. The outlet cock shall conform to IS : 3382-1975*;

f) Dial type indicating thermometer having a range of 50° to 150°C, graduated in 1°C divisions;

g) Pressure relief valve capable of being set to blow off when pressure in the jacket(s) exceeds the designed pressure by 20 kPa;

NOTE — A pressure reducing valve and pressure gauge shall be provided by the user in case the pressure of steam in the mains is higher than the working pressure of the pan.

h) If required by the purchaser, the pans of 500- and 1 000-litre capacities shall be fitted with an electric motor operated agitator with scraping device. The mechanical agitator shall be suspended from a bridge over the pan; and

j) If required by the purchaser, the ghee pans may be provided with graduated dip-sticks suspended in suitable fixed brackets.

7. TESTS

7.1 Leakage Test for Pan — The pan with the fittings shall not leak when filled with water up to the brim and allowed to stand for six hours.

7.2 Pressure Test for Jacket — The jacket shall be designed for a steam working pressure of 300 kPa. The jacket with the fittings and accessories shall be hydraulically tested at manufacturer's works for a pressure of 450 kPa. The pressure shall be applied in the space between the pan and the jacket and shall be maintained for a period of not less than 30 minutes. The jacket shall be free from leaks.

8. MARKING

8.1 Each pan shall be indelibly marked with the following information:

a) Manufacturer's name, trade-mark or initials;

b) Manufacturer's identification;

c) Safe working pressure;

d) Test pressure and date of test;

e) Capacity of the pan; and

f) Year of manufacture.

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*Specification for stainless steel milk pipes and fittings.

8.1.1 Each pan may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (*Certification Marks*) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INDIAN STANDARDS ON DAIRY EQUIPMENT

IS:

1373-1967	Tinned mild steel milk cans (*second revision*)
1392-1971	Glass milk bottles (*second revision*)
1516-1972	Milk strainers (*amalgamated version of* IS : 1516 *and* IS : 1733)
1613-1960	Milk bottle crates
1705-1972	Aluminium foil for milk bottle caps (*first revision*)
1825-1971	Aluminium milk cans (*first revision*).
2144-1962	Hand-operated bottle washer
2145-1962	Hand bottle filler
2146-1962	Hand-operated cap sealer for milk bottles
2235-1962	Cheese vats
2242-1973	Ice chamber for 40- and 50-litre milk cans
2336-1963	Stainless steel milk vats
2337-1963	Aluminium milk vats
2342-1963	Manually operated milk can washer
2343-1963	Can washing trough
2492-1976	Stainless steel road milk tankers (*first revision*).
2495-1963	Cheese hoops
2497-1963	Wooden butter scoop
2498-1963	Cheese knife
2499-1978	Butter-scotch-hand (*first revision*).
2504-1964	Hand-operated cheese press (vertical)
2647-1964	Cheese mill
2649-1964	Hand operated butter worker
2688-1964	Insulated stainless steel milk storage tanks
2689-1964	Batch pasteurizer (stainless steel)
2703-1964	Hand-operated butter churn (end-over-end)
2706-1964	Batch pasteurizer (aluminium)
2822-1964	Butter moulding machine
3382-1965	Stainless steel milk pipes and fittings
3661-1966	Farm milk cooling tanks
3662-1966	Insulated aluminium milk storage tanks
4192-1967	Aluminium farm milk cooling tanks
4742-1968	Settling tanks for ghee (aluminium)
4743-1968	Settling tanks for ghee (stainless steel)
4767-1968	Steam jacketed ghee pans (aluminium)
4937-1968	Insulated milk cans (aluminium)
4938-1968	Insulated stainless steel milk storage tanks (vertical type 10 000 and 15 000 litres capacity)
5253-1969	Guidelines for cleaning and sterilizing dairy equipment
5567-1970	Bottles for sterilized milk
6591-1972	Rail milk tankers
6684-1972	Milk can trolleys

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 $kg.m/s^2$
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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